ENVIRONMENTAL HOT TOPICS

By David Dunn

What Vermont has done to develop successful anaerobic digestion systems on the state's dairies can work in other states

Vermont's Cow Power is a success

The first anaerobic digester (AD) in Vermont was completed in 1982 on the Foster Brothers Farm in Middlebury. Designed by Spencer Bennett of Hadley Bennett Engineers, the digester, along with one at Mason Dixon Farm in Gettysburg, Pa., is the oldest operating system in the United States.

The industry has learned a lot since 1982 when AD system failures were more common than successes. But challenges remain. In 1982, as today, we need to know how to build and efficiently operate a cost-effective AD system that benefits both dairy farms and the environment.

We don't have all the answers to widespread AD development in Vermont, but with the emphasis today on renewable energy, more people than ever are interested in AD. If investors are willing to come to a dairy and construct, own and operate an AD system, why can't we keep the economic and environmental value received by a third party with the farm?

Vermont has nine anaerobic digesters operating with three more set to go on-line this year. Public support, utility company innovation and government agency collaboration have contributed to AD adoption in the state.

Vermont's approach

Today in Vermont we have nine anaerobic digesters operating, with three more set to go on-line this year. Of the approximately 140,000 dairy cows in the state, about 8,000 milking cows, plus their associated dry and youngstock, are on dairies with digesters.

These numbers are the result of collaboration between government agencies, the work of a utility company and the public's belief that renewable energy has societal and environmental value.

Here's the back story. In 2003, after eight years of my implementing energy efficiency projects for some 700 Vermont dairy farms at Central Vermont Public Service Corp. (CVPS), an electric utility, it was time to focus on something new that would return value to the dairies and the utility company. AD was that something new.

The Vermont Agency of Agriculture and the state's Department of Public Service had secured grant funding from Vermont's Sen. Jim Jeffords a few years earlier to study the road blocks to AD development.

They found these: low wholesale energy price, lenders unfamiliar with the technology, additional work load for dairies and low milk prices reducing the possibility for investment. The joint agency-managed research also identified the manure and organic waste resources available in Vermont.

This grant led to a partnership between the Agency of Agriculture and Dr. Stanley Weeks to design a vertical digester. One was eventually installed in 2004 on a 250-cow dairy in Shelburne.

CVPS followed a somewhat parallel, yet divergent, path. At the time, farm-based net metering was

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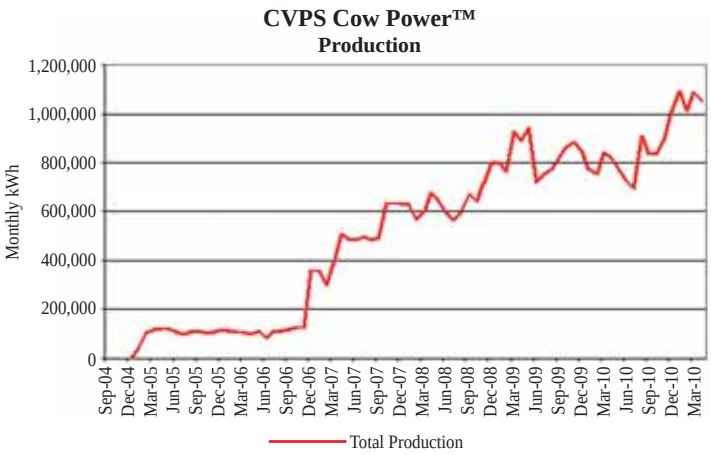

capped at 250 kW and was designed to offset the energy use of the group of farm accounts. But the largest farms in Vermont could produce twice, if not three times, the total energy use of their multiple electrical accounts. So CVPS created Cow Power™ as a way for farms to earn a premium price for their renewable energy.

Cow Power™ was born from a belief that people will support a project they see as valuable. CVPS customers can sign up to purchase 25%, 50% or all of their energy through the program.

In Vermont 2.4% of the residential and 1% of the commercial customers signed up to pay an extra 4 cents per kWh on all or a portion of their electric bill to provide this incentive for farmers. Residential customers can sign up and drop out of the program at will; commercial customers must sign a three-year commitment.

CVPS has collected more than $2.7 million from retail customers' electric bills since 2004 and passed 100% to the Cow Power™ producers first. Remaining money supported other qualified projects in the region or transferred to the CVPS Renewable Development Fund (RDF) to provide grants to the next round of farms.

Cow Power™ fringe benefits include helping participating dairies diversify their operation, generate stall bedding and maintain a working landscape with less odor than is associated with long-term manure storage and subsequent land application.

Overcoming obstacles

Work in Vermont on AD has shed light on obstacles to its widespread development. These include capital cost, complexity, reliability and grid interconnection. It seems as though larger U.S. dairies – those with 3,000 head or more – might be able to justify an AD project based solely on odor reduction. But in Vermont, where the average farm is 120 cows, and the largest is milking 1,500 cows, we faced a different set of hurdles.

Across the Northeast there is a strong need for societal investments in AD projects. This is justified, in my opinion, by the societal benefits of odor reduction, greenhouse gas destruction and renewable energy generation from the AD of agricultural products and byproducts, both on- and off-farm.

Federal grant dollars available through the USDA Rural Development (RD) and Natural Resources Conservation Service (NRCS) are critical to every project in Vermont. They have averaged 25% of the project costs. Also critical is Agency of Agriculture funding, as well as a state program called the Clean Energy Development Fund (CEDF). It was created through a fee charged by the state to Entergy Nuclear for the nuclear plant's capacity uprate and dry cask fuel storage on site.

CVPS was also successful at creating a Renewable Development Fund (RDF) through a utility insurance policy that returned cash value to help with the often significant interconnetion costs.

As a rough average USDA RD provided $400,000, CEDF $250,000, the Agency of Agriculture $75,000 and the CVPS RDF $100,000 towards projects that approach $2 million in total costs. At present all of this funding is at risk or already dispersed without new funding options.

It's important to note that the rural Northeast's electric distribution system was never designed for distributed generation – that is for farms to produce electrical power and place it on the grid. There are significant challenges and costs to assure reliable and safe operation of remote generators.

In Vermont we learned that it's critical to the success of AD projects to have an impartial project coordinator to work for farm owners. This person understands and focuses on the dairy and digester industry, the funding and grant opportunities, and the various permitting, planning and electric utility requirements. This champion for the farm is a critical piece of the success story.

You can be as successful with AD on dairies as we are in Vermont. Remember, Vermont, with a population of 622,000, has only 2.4% of residential customers contributing. Think of it, 2% -- only 3,400 accounts – created more projects in Vermont per farm customer than anywhere else in the United States. New York could have nearly 50 projects to match Vermont's 12 on-line in 2011. ❐

Keys to growth of anaerobic digester

- Educate the consumer. Tell the benefits of AD, especially compared to wind and solar options.
- Take full advantage of federal grants, as well as others. Look for incentives such as through the New York State Energy Research and Development Authority (NYSERDA).
- Ask customers to contribute to support these projects. You might even create an Energy Service Company (ESCO) that provides energy from farm projects in deregulated utility states.
- Find someone who knows dairy farming and AD, but who is independent of digester vendors, to work directly with farmers.
- Identify a champion at the interconnecting utility.